

Name: _____

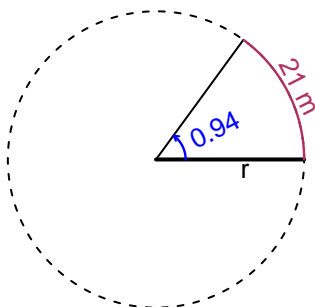
Date: _____

Trig Final (Solution v48)

- You should have a calculator (like [Desmos](#)) and a [unit-circle](#) reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The angle measure is 0.94 radians. The arc length is 21 meters. How long is the radius in meters?

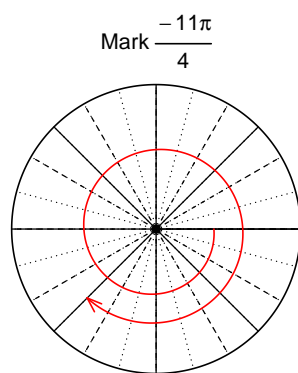


$$\theta = \frac{L}{r} \quad r = \frac{L}{\theta} \quad L = r\theta$$

$r = 22.34$ meters.

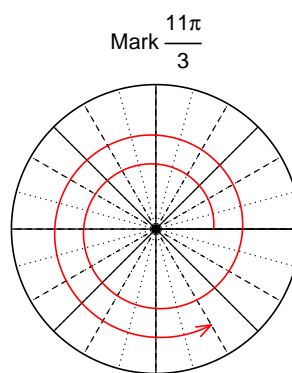
Question 2

Consider angles $-\frac{11\pi}{4}$ and $\frac{11\pi}{3}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\cos\left(-\frac{11\pi}{4}\right)$ and $\sin\left(\frac{11\pi}{3}\right)$ by using a unit circle (provided separately).



Find $\cos(-11\pi/4)$

$$\cos(-11\pi/4) = \frac{-\sqrt{2}}{2}$$



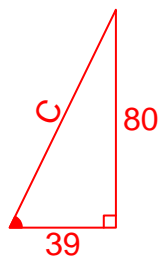
Find $\sin(11\pi/3)$

$$\sin(11\pi/3) = \frac{-\sqrt{3}}{2}$$

Question 3

If $\tan(\theta) = \frac{-80}{39}$, and θ is in quadrant IV, determine an exact value for $\sin(\theta)$.

Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



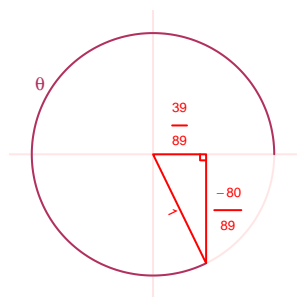
Solve the Pythagorean Equation

$$39^2 + 80^2 = C^2$$

$$C = \sqrt{39^2 + 80^2}$$

$$C = 89$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant IV in a unit circle.



$$\sin(\theta) = \frac{-80}{89}$$

Question 4

A mass-spring system oscillates vertically with an amplitude of 8.94 meters, a frequency of 5.41 Hz, and a midline at $y = 7.72$ meters. At $t = 0$, the mass is at the midline and moving up. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = 8.94 \sin(2\pi 5.41t) + 7.72$$

or

$$y = 8.94 \sin(10.82\pi t) + 7.72$$

or

$$y = 8.94 \sin(33.99t) + 7.72$$